United States Department of Agriculture

NRCS

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TECHNICAL NOTE

HYDROLOGY TECHNICAL NOTE NO. 4 **MARCH 26, 2003**

TILE GUIDELINES FOR PROTECTING WETLAND HYDROLOGY

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A. Tiling guidelines near groundwater recharge depressional wetlands (see Scenario 1, Options 1, 2, and 3).

General

1. Determine if groundwater recharge wetland:
   a. Hydrochloric acid test for calcium carbonate (should be no effervescence in upper soil layer; exception may be the edges of the wetland).
   b. Check list of potential groundwater recharge hydric soils (see Table 1).
2. Lateral effect distances determined using drain program using the van Schilfgaarde equation (adjust lateral effect distances for land slope if applicable).
3. If tile has surface inlets in the watershed draining to the wetland, the tile must outlet upstream of the downstream wetland.
4. Make final determination using professional judgement and experience.

Tiling guidelines near groundwater recharge depressional wetlands

Option 1: Route tile around wetland (see Scenario1, Option 1)

1. Keep perforated tile away from the wetland the lateral effect distance on all sides.
2. Use nonperforated tile if tile is less than the lateral effect distance away from the wetland.
3. No upstream surface tile inlets allowed (water must not bypass downstream wetlands).

Option 2: Outlet tile on upstream end of wetland (see Scenario 1, Option 2)

1. Set upstream tile standpipe outlet at height to maintain existing wetland outlet elevation.
2. Set downstream tile standpipe inlet (if not ending tile at recharge wetland) at a height to maintain existing wetland outlet elevation.
3. Keep perforated tile away from the wetland the lateral effect distance on all sides.
4. Use nonperforated tile if tile is less than the lateral effect distance away from the wetland.

Option 3: Nonperforated tile through wetland (see Scenario1, Option 3)

1. Keep perforated tile away from the wetland the lateral effect distance on all sides.
2. Minimize excavation and tile in the wetland.
3. No upstream surface tile inlets allowed (water must not bypass downstream wetlands).

B. Tiling guidelines near groundwater discharge depressional wetlands (see Scenario 2, Options 1, 2, and 3)

General

1. Determine if discharge wetland:
   a. Hydrochloric acid test for calcium carbonate (should be effervescence in upper soil layer).
   b. Check list of potential groundwater discharge hydric soils (see Table 1); please note that other soils not in this table also may discharge water to wetlands and should be treated accordingly.
   c. Consult with soil scientists.
2. Keep perforated tile three times the lateral effect distance from the wetland on the sides where groundwater is likely to enter the wetland.
3. Lateral effect distances determined using drain program using the van Schilfgaarde equation (adjust lateral effect distances for land slope if applicable).
4. If tile has surface inlets in the watershed draining to the wetland, the tile must outlet upstream of the downstream wetland.
5. One exception to the three times the lateral effect distance rule is the case where the discharge wetland receives groundwater flow from a perched water table from uphill slopes. A shallow impermeable layer (bedrock or a soil with a hydraulic conductivity that is less than the layer above by a factor of 10) causes the perched water table. The lateral effect tables are not applicable for this case as the tables only apply to cases where the impermeable layer is at least 10 feet deep and the water table surface and impermeable layers are nearly horizontal. No perforated tile will be allowed across the hillside slope as the tile would significantly impact the hydrology of the wetland.[1]
6. Make final determination using professional judgement and experience.

Tiling guidelines near groundwater discharge depressional wetlands

Option 1: Outlet tile on upstream end of wetland (Scenario 2, Option 1)

1. Set upstream tile standpipe outlet at height to maintain existing wetland outlet elevation.
2. Set downstream tile standpipe inlet (if not ending tile at discharge wetland) at a height to maintain existing wetland outlet elevation.
3. Keep perforated tile away from the wetland the lateral effect distance on all sides except where intercepting groundwater flow to wetland (for this case, use three times the lateral effect distance or do not allow any tiling[1].
4. Use nonperforated tile if tile is less than the lateral effect distance (three times the lateral effect distance if applicable) away from the wetland.

Option 2: Route tile around wetland (Scenario 2, Option 2)

1. Keep perforated tile away from the wetland the lateral effect distance on all sides except where intercepting groundwater flow to wetland (for this case, use three times the lateral effect distance or do not allow any tiling[1].
2. Use nonperforated tile if tile is less than the lateral effect distance (three times the lateral effect distance if applicable) away from the wetland.
3. May want to consult soil scientists and/or engineers for consultation about groundwater flow directions.
4. No upstream surface tile inlets allowed (water must not bypass downstream wetlands).

Option 3: Nonperforated tile through wetland (Scenario 2, Option 3)

1. Keep perforated tile away from the wetland the lateral effect distance on all sides except where intercepting groundwater flow to wetland (for this case, use three times the lateral effect distance or do not allow any tiling[1].
2. Use nonperforated tile if tile is less than the lateral effect distance (three times the lateral effect distance if applicable) away from the wetland.
3. May want to consult soil scientists and/or engineers for consultation about groundwater flow directions.
4. No upstream surface tile inlets allowed (water must not bypass downstream wetlands).
5. Minimize excavation and tile in wetland.

C. **Outleting tile into streams through floodplains with downstream floodplain wetlands (see Scenario 3A and 3B)**

1. Discourage landowner/operator from running perforated or nonperforated tile through depressional wetlands in floodplains if another route is available.
2. Advise landowner that it is their responsibility to get necessary permits/permissions from U.S. Army Corps of Engineers if tile outlets in "Waters of the U.S."
3. Advise landowner that they must obtain all necessary permits/permissions from any required state and local entities before outleting tile in streams.
4. If there are downstream wetlands associated with the stream and tile drains land upstream of the wetlands, tile must outlet upstream of the wetlands.
5. Try to minimize length of nonperforated tile through any floodplain wetlands (route tile perpendicular through wetland to stream with nonperforated tile).
6. Keep perforated tile away from the wetland the lateral effect distance on all sides except where intercepting groundwater flow to discharge wetlands (for this case, use three times the lateral effect distance or do not allow any tiling[1].
7. Use nonperforated tile if tile is less than the lateral effect (three times the lateral effect distance if applicable) away from any wetlands in the floodplain.
8. Make final determination using professional judgement and experience.

D. Sloped Wetlands

Nondepressional wetlands occurring on slopes with no defined channels will be evaluated on a case-by-case basis in the field by a soil scientist and/or engineer/hydrologist. If the predominant source of water to the wetland is from groundwater, no tiling will be allowed in the upstream or lateral land area where the groundwater flow is coming from unless the tiling system outlets on the upstream end of the sloped wetland.

Table 1. Potential Groundwater Recharge and Discharge Hydric Soils

Potential Groundwater Recharge Hydric Soils in Depressions	
Dimmick	Parnell
Dovray	Plankinton
Heil	Rimlap
Hoven	Shue
Kolls	Tetonka
Koto	Tiffany
Macken	Toko
Nishon	Tonka
Overshue	Worthing

Potential Groundwater Discharge Hydric Soils in Depressions	
Albaton, Depressional	Minnewasta
Baltic	Minewauken
Colvin[3]	Oldham
Ludden, Ponded	Orwet
Lute	Parnell, Ponded[3]
Mauvais	Southam
McKenzie	Worthing, Ponded[3]

Hydric Soils not in Depressions		
Albaton	Fedora	Loup
Arlo	Flom	Lowe
Arveson	Forney	Ludden
Badger[2]	Fossum	Luton
Badus	Gannett	Marshbrook[2]
Baltic, Flooded	Glenross	Marysland
Bigwinder	Grat	Napa
Borup	Hamar	Norway
Calco	Harps	Obert
Canisteo	Harriet	Owego
Castlewood	Hegne	Playmoor
Chancellor[2]	Herdcamp	Rauville
Chaska[2]	Hidewood	Regan
Clamo[2]	Higgins	Ryan
Colvin[3]	Holmquist	Sage
Crossplain[2]	James	Salmo
Cutcomb	Kratka	Sarpy[1, 2]
Dogiecreek	Lallie	Stirum
Durrstein	Lamo, Wet[2]	Vallers
Egas	Lamoure[2]	Venlo
Elpam	Lawet[2]	Whitewood[2]

[1]Some phases of this soil are not frequently flooded for long duration.

[2] Some phases of this series are not hydric.

[3]May be a discharge depressional wetland in some map units. Check landscape and Calcium Carbonate.

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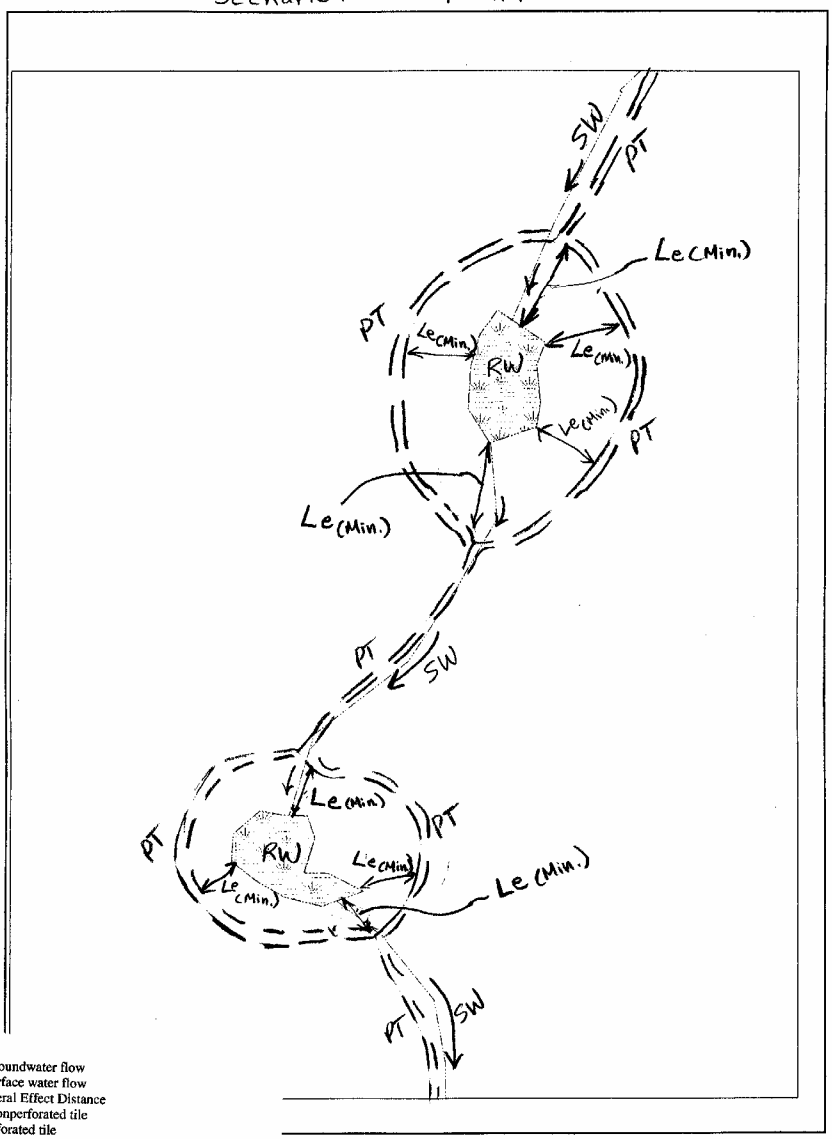
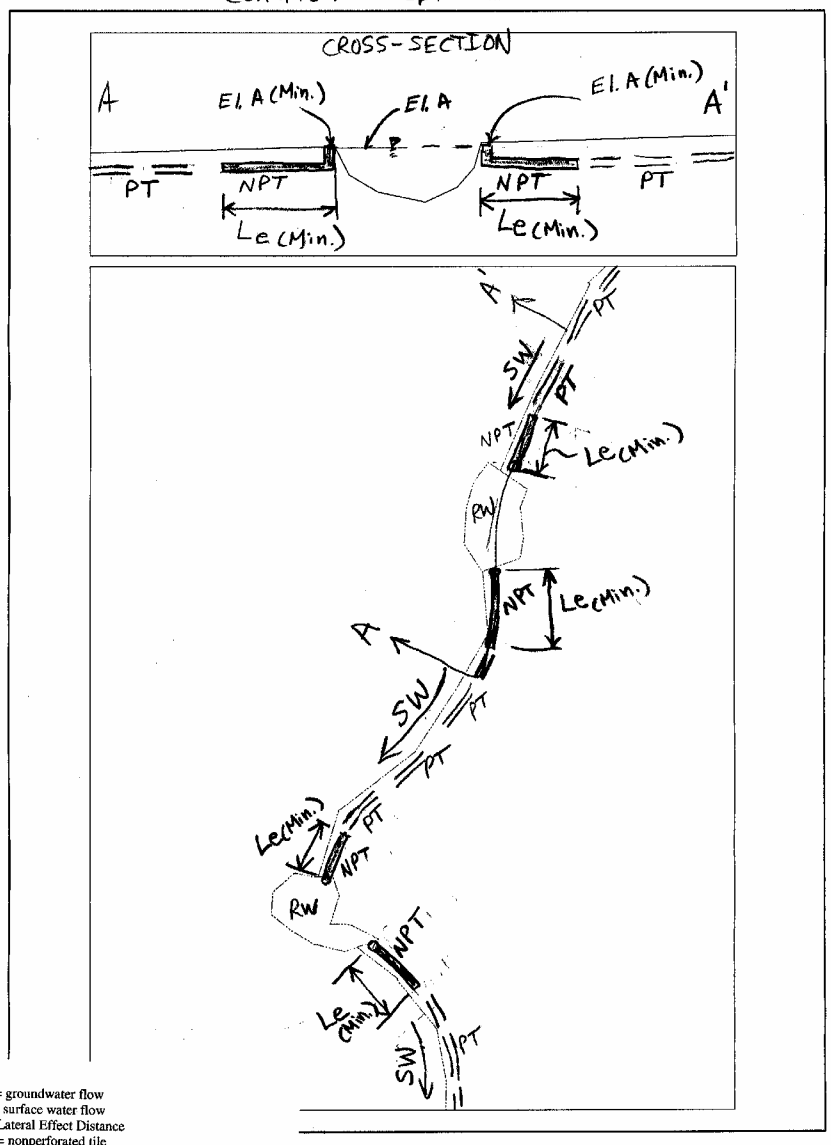
Scenario 1 Option 1



KEY
GW = groundwater flow
SW = surface water flow
Le = Lateral Effect Distance
NPT = nonperforated tile
PT = perforated tile
RW = recharge depressional wetland
DW = discharge depressional wetland (predominantly)
FPW = flood plain wetland

Min. = minimum
El. = elevation

Scenario 1 Option 2



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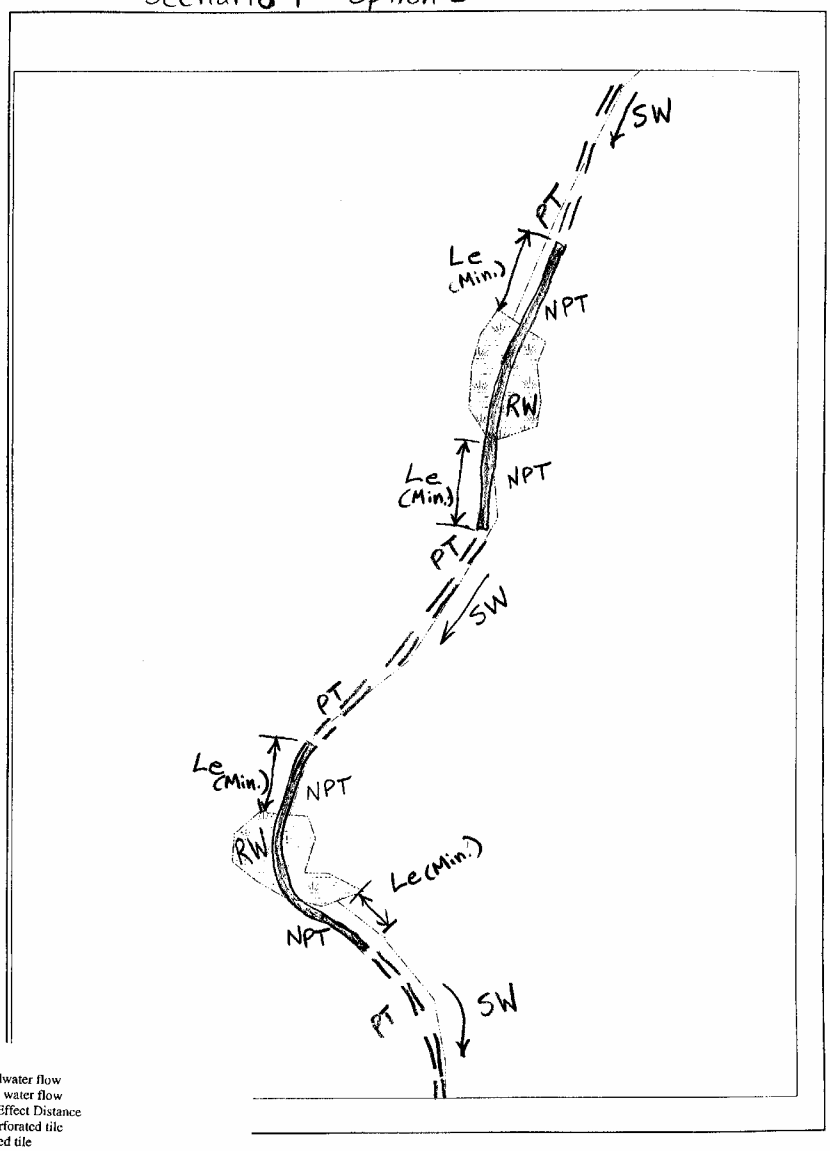
Scenario 1 Option 3



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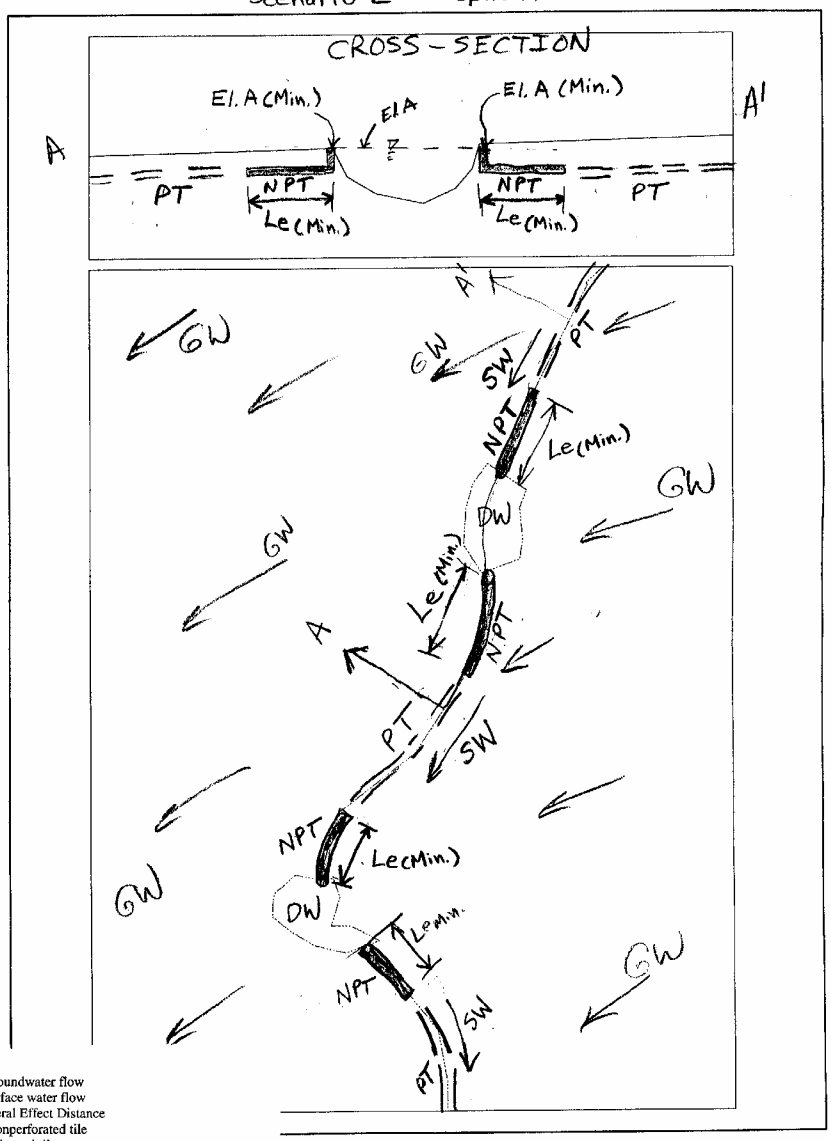
Scenario
Option

Scenario 2 Option 1



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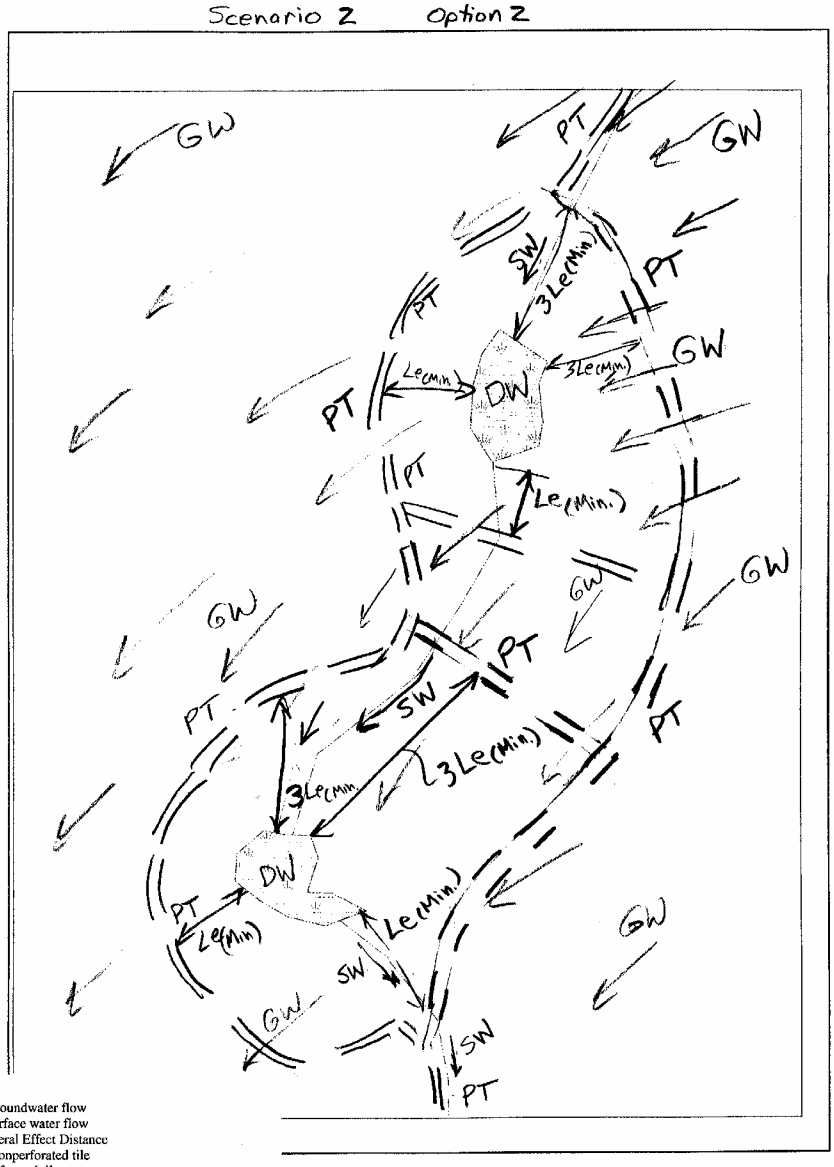
Scenario 2 option 2



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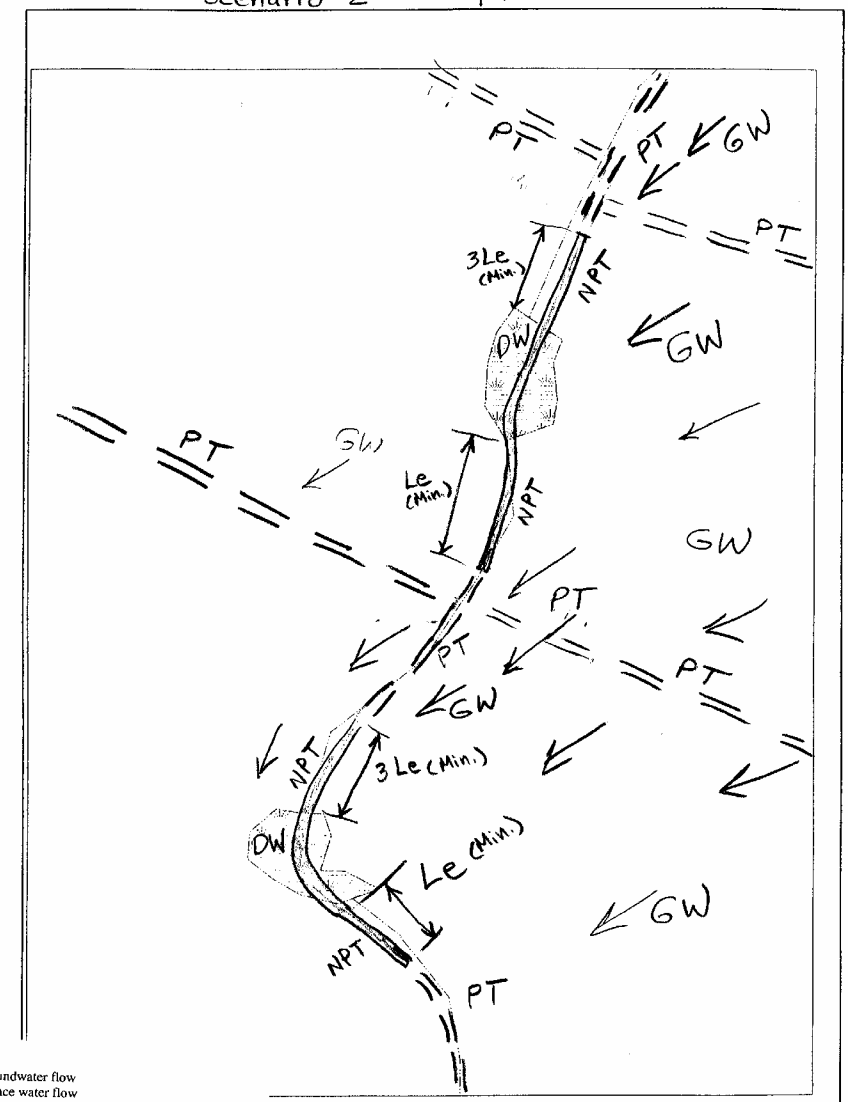
Scenario 2 Option 3



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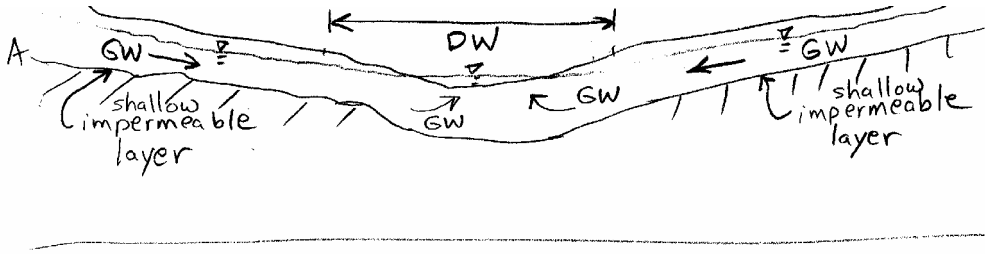
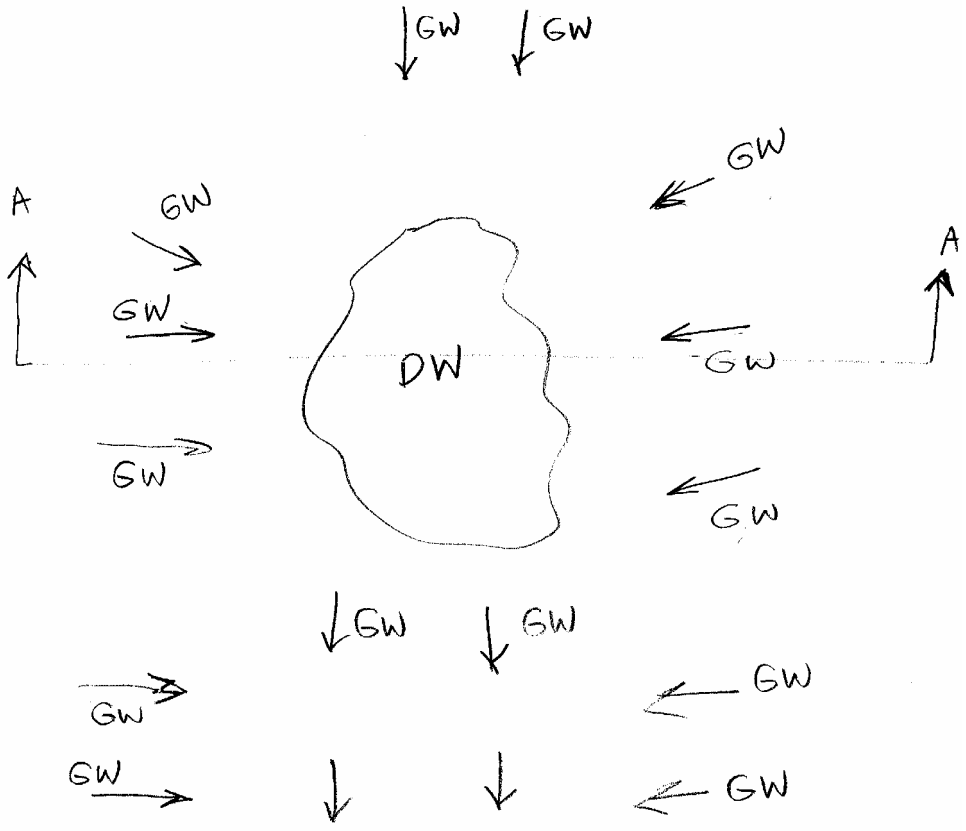
Scenario 2 - exception
CROSS-SECTION A-A'





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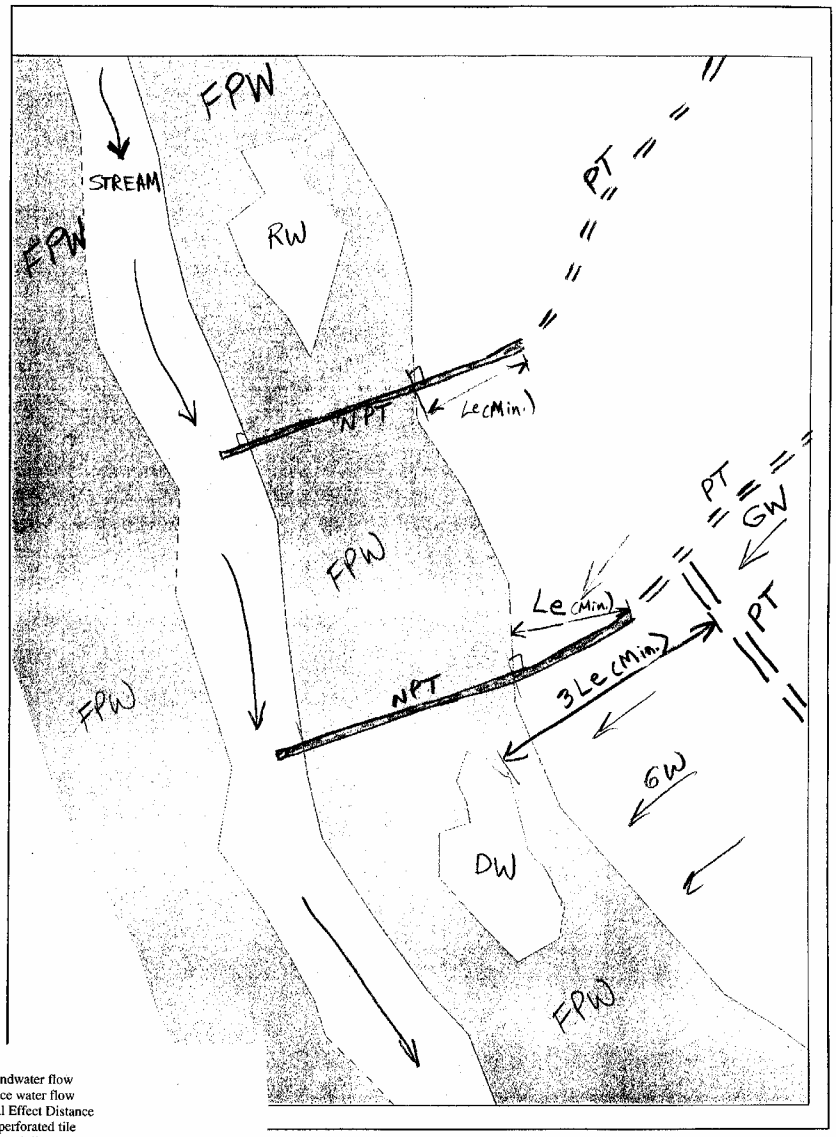
Scenario 3A



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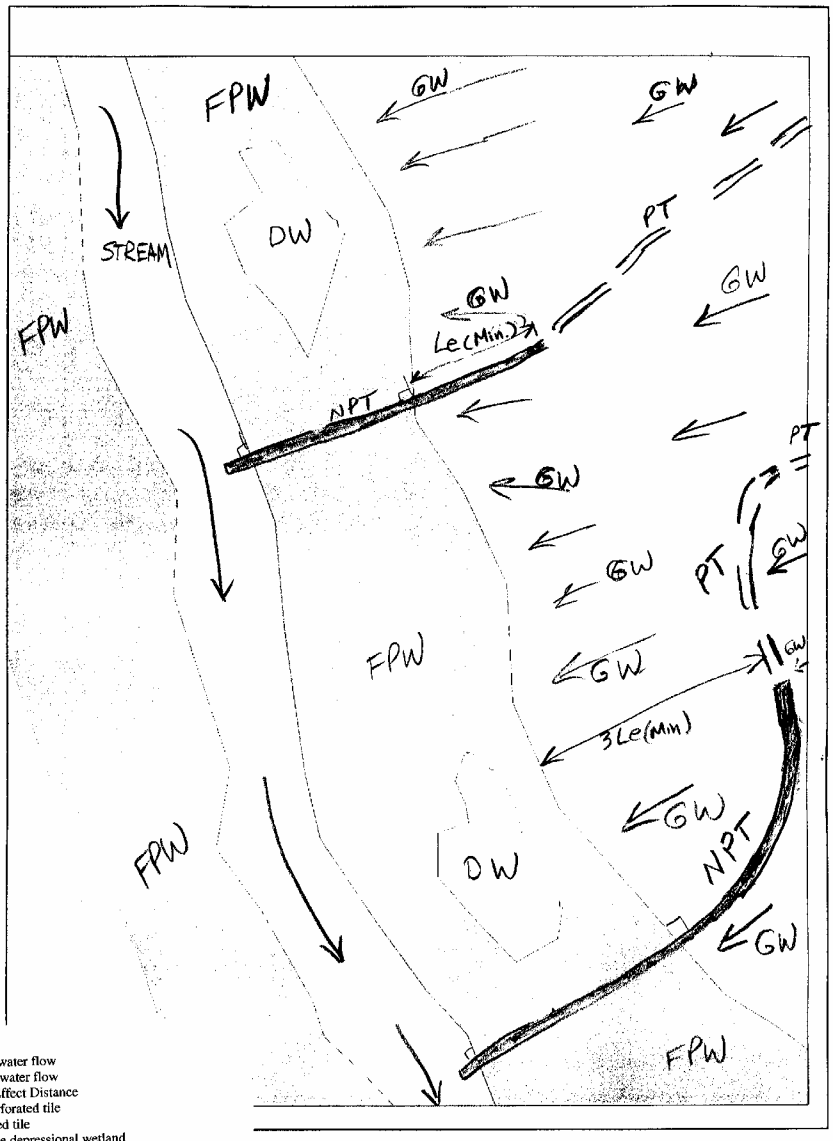
Scenario 3B



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